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THE MIND OF THE FLOCK

By R. C. MILLER

THE BEHAVIOR of individuals in a group affords one of the most puzzling problems of psychology. Throughout the animal kingdom we find among gregarious forms a unity of purpose and a tendency to concerted action which does not readily yield itself to explanation. The synchronous flashing of fire-flies; the manner in which the gregarious larvae of certain saw-flies curl their tails upward by a common impulse when approached; the well-ordered flight of wild geese, or the intricate gyrations of a flock of Golden Plover, a hundred birds darting and wheeling with a grace and precision which no amount of training could impart; the behavior of stampeding sheep or cattle; the conduct of men at a political rally, or at a lynching; these are random examples of a unified type of action characteristic of groups.

It is axiomatic that the mind of the group is a very different thing from the sum of the minds of the individuals composing it. As Le Bon (1897, p. v) observes of crowds, "from the mere fact of their being assembled, there result certain new psychological characteristics . . . (p. 6) just as in chemistry certain elements, when brought into contact—bases and acids, for example—combine to form a new body possessing properties quite different from those of the bodies that have served to form it". But this analogy, admirably as it states the case, hardly helps us towards an explanation of it, since the origin of the new properties insisted upon is quite as obscure in the one instance as in the other.

The special characteristics of organized groups, according to Le Bon (*loc. cit.*), are three: suggestibility, contagion, and the possession of a sort of collective mind. As he announces shortly that contagion is an effect of suggestibility, there seems to be no good reason for considering these items separately; suggestibility, furthermore, can hardly be discussed apart from its relation to the collective mind; the real problem of the group psychologist is, therefore, to find an adequate explanation of the group mind.

It was assumed by the earlier observers, with a placid anthropomorphism, that the animal flock is organized somewhat on the plan of a military company, with a regularly appointed leader who directs the movements of the group by means of signals or even vocal commands. Such a conception seemed particularly plausible in the case of the avian flock, where there is often apparent evidence of a leader and where, moreover, there is unquestionably an exchange of vocal signals more or less meaningful. I recall reading, on one of my first excursions into natural history literature, a learned account of the language of crows, which undertook to explain the flock behavior of these birds on the basis of "caws" of varying number and intensity uttered by the leader, and even ventured a tentative crow-vocabulary. Unfortunately I was unable to profit by this information, as the crows of my acquaintance apparently spoke a different dialect!

With the application of critical methods to the study of animal behavior, it became evident that birds are not diminutive human beings with wings and feathers, and the old explanation was found no longer to suffice. Thereupon the pendulum swung in the opposite direction, and it was insisted that the behavior of the flock, with its unity of impulse and remarkable coördination of

action, is inexplicable in terms of the five senses, and must be based upon principles of which we have no definite knowledge.

As a result of this conception, there has been a tendency to speculation rather than careful study, and certain of the phenomena of group behavior have been adduced as evidence in support of various mystical beliefs.

An English writer who is presumably a very good naturalist has lately advocated the opinion (Newland, 1917, p. 104) that every sentient being is an incarnate fragment of the All Mind; hence the members of a flock act in unison because they are directed by a common intelligence. Still more recently it has been insisted by Long (1919, p. 74 ff.) that a mysterious "natural telepathy" is responsible for the passage of impulses from individual to individual in the animal flock. Dogs, wolves, caribou, Indians and Bushmen, he thinks, are possessed of a "supersense", an extremely useful appurtenance which civilized man has been careless enough to lose. Numerous other examples of more or less extravagant interpretations might be cited.

Unfortunately for such views, the group-mind is not at all the perfect instrument that they assume. It often stumbles in a manner unworthy of an All Mind, and hesitates in a fashion inconsistent with the idea of a perfectly functioning natural telepathy. Furthermore, we are able to trace among gregarious forms a progression from a simple to a complex type of organization; in the case of the more loosely organized groups we are able to explain behavior in terms of known facts of psychology, and it is logical to suppose that greater complexity is a difference, not of kind, but of degree only.

In a previous paper (Miller, 1921) attention has been called to the Bush-tit (*Psaltriparus minimus*) as a bird manifesting a relatively simple and loose flock organization. Coördination here takes place as a rule rather slowly, and the observer is able to witness the actual steps in the process.

When the Bush-tits behave at all as a unit, it is by the method that I have termed the "spread of impulse". If the flock moves from one place to another, it is because one bird, or occasionally two or three birds at a time, are stimulated by hunger to a change of location; the impulse spreads, not telepathically, but through the ordinary channels of sight and hearing, and the flock follows suit. If an enemy appears, it is sighted perhaps by only one or a few of the flock; from them the impulse spreads, almost instantaneously in this case, but through the medium of sound, to the others, so that those birds who may not have seen the enemy unite in the "confusion chorus". There is nothing in their behavior to suggest telepathy, or any mysterious type of psychic communication. Indeed a practised observer is often able, by noting the nature of the initial stimulus, to anticipate the reaction of the flock, although it is hardly to be supposed that he has for the moment become identified with what Newland (*loc. cit.*) has called the "group soul."

The movements of a flock of English Sparrows when unmolested are similar in certain respects to those of a band of Bush-tits; a few birds take the lead and the others follow. Kessel (1921) has observed that the California Valley Quail are "stimulated to flight by the leader," which he suggests further on may be any member of the flock that takes the initiative for the moment. It is stated by Woodward (1921, p. 138) of the collective soaring of gulls that "they start with perhaps a dozen or two birds, but these are soon joined from all directions by other gulls in two's and three's until 100 to 200 birds are in the air at once". Thus the spread of impulse through the group

is by no means a phenomenon peculiar to the Bush-tits, but one appearing in widely separated species of bird.

Elsewhere in the animal kingdom we find parallel examples, suggesting that this type of behavior is still more generally distributed. Dr. E. C. Van Dyke informs me that the saw-fly larvae above referred to do not react simultaneously as has been claimed (Newland, p. 38), but that the impulse can be observed to spread from individual to individual, probably as a tactile stimulus. Groos (1898, p. 208) remarks of gregarious mammals that "the playful act of one animal spreads through the whole company like a sudden contagion", and observes, "when one cow in a herd leaps down the slopes where they are grazing, a large part of the herd will often follow".

The behavior of crowds is essentially a phenomenon of the same sort. We do not see a thousand men become wildly enthused, or angry, or panic stricken in an instant. A few individuals are first moved by these emotions; by voice, or gesture, or appearance, their state of mind is conveyed to their immediate neighbors; the impulse spreads until the whole group is affected; their own shouts and cries excite them further, until we may witness a crowd of intelligent men shortly converted into an unthinking mob, with a unity of purpose which may lead to the most heroic or the most senseless acts.

A "Go West" movement or a Klondike stampede are phenomena essentially similar to the movement of a flock of Bush-tits from one chaparral clump to another.

An analogy may be drawn between spread of impulse in the group and the spread of an impulse through the nervous system of certain invertebrates. In a medusa, for example, or a sea-urchin, the part of the body immediately stimulated first responds; coördination of action takes place slowly, spreading from part to part, until at last the whole organism is in motion. No part controls the rest. No reactions are controlled by the central nervous system. Von Uexküll (1909, p. 118) has called the sea-urchin a "republic of reflexes", and remarks ingeniously that "the legs (spines) move the animal", as contrasted with the higher animals, where "the animal moves the legs". Which-ever part takes the lead depends upon circumstances, and the rest of the body gradually coöperates.

Thus there is evident a comparison between coördination of action in a simple animal and coördination of action in the group. The flock behaves as a sort of *primitive organism*.

Indeed it has been insisted by Huxley (1912, Chap. V) that any organized group may rightly be considered a form of individual. Whatever individuality the flock possesses, however, is usually of a very vague and imperfect type; the individualities of the component parts are incompletely merged with the individuality of the whole, and may even come into conflict with it or with one another, as when a band of Bush-tits undertakes to move in two or three directions at once (Miller, 1921, p. 126); "the legs move the animal"; the individuals move the flock, rather than the flock the individuals.

In all the instances cited there is nothing which may not be explained with good reason on the basis of the spread of impulse through normal physical channels. There may indeed be a hyper-sensitiveness to suggestion, a tendency for the individual to be alert and readily responsive to impulses coming from his neighbors, but this, as Trotter (1916, p. 108) observes, is one of the fundamental characteristics of gregarious animals. We have no occasion to

call in the assistance of natural telepathy or any other peculiar psychic force to explain the facts. Such explanations merely reduce the known to terms of the unknown, and claim to have solved the problem when they have only avoided it.

That organized groups are possessed of a more or less definite "aggregate mind" there seems to be ample evidence. That this collective mind exhibits certain peculiar properties distinct from those of the individual minds composing it, few will deny. But that these properties are of a hypnotic (Le Bon, p. 10) or telepathic (Long, *loc. cit.*) nature, satisfactory evidence is lacking. It is the belief of the writer that the spread of impulse—exceedingly rapid in well organized groups, slowly enough to be readily observed in less unified aggregations, but always through the normal channels of sense—is entirely adequate to explain the mind of the flock.

LITERATURE CITED

- Groos, K.
1898. The play of animals. Baldwin translation. (New York, D. Appleton and Co.), xxvi+341 pp.
- Huxley, J. S.
1912. The individual in the animal kingdom. (Cambridge, University Press), 167 pp.
- Kessel, J. F.
1921. Flocking habits of the California Valley Quail. Condor, vol. 23, pp. 167-168.
- Le Bon, G.
1897. The crowd. Second ed. (London, T. Fisher Unwin), xxii+219 pp.
- Long, W. J.
1919. How animals talk. (New York, Harper and Brothers), 302 pp., 8 pls.
- Miller, R. C.
1921. The flock behavior of the Coast Bush-tit. Condor, vol. 23, pp. 121-127.
- Newland, C. B.
1917. What is instinct? (New York, Frederick A. Stokes and Co.), xvi+217 pp., 18 pls.
- Trotter, W.
1916. Instincts of the herd in peace and war. (London, T. Fisher Unwin, Ltd.), 218 pp.
- Uexküll, J. von
1909. Umwelt und Innenwelt der Tiere. (Berlin, Julius Springer), 259 pp.
- Woodward, C. H.
1921. The California Brown Pelican as a navigator. Condor, vol. 23, pp. 137-138.

Department of Zoology, University of California, October 4, 1921.